REMARKS

Claims 1-7, 20, and 22 were previously canceled (See Amendment dated June 17, 2003). Claims 40-51 are hereby canceled. Claims 8, 15 and 52 have been amended. Accordingly, claims 8-19, 21, 23-39, and 52-58 are presently pending. No new matter has been added.

35 U.S.C. § 102(b) & § 103

Claims 8-11, 13, 15-19, 21, 25-28, 32-35, and 39 stand rejected under 35 U.S.C. § 102(b) as being allegedly anticipated by Portier (US Patent No. 4,775,650). Specifically, the Office alleged that Portier teaches an acid-treated chitosan composition.

To anticipate a claimed invention under 35 U.S.C. § 102, the single prior art reference must teach each and every element of the claimed invention. Dayco Products, Inc. v. Total Containment, Inc., 66 U.S.P.Q.2d 1801, 1809 (Fed. Cir. 2003). Portier does not teach an oxalic acid-treated ceramic or perlite support material. Claims 8, 15 and 52 have been amended to recite "an oxalic acid-treated" ceramic or perlite bearing an exterior coating of chitosan thereon. Portier in passing mentions acid-treated support. However, Portier does not specifically teach any particular acid, especially oxalic acid. Portier also does not teach or suggest the particular acid to treat the support that would be appropriate in allowing the support to effectively bind chitosan. In the present invention, the oxalate complexes bring negative charge to the surface. The surface negative charge complex binds with the positively (protonated) amine of the chitosan, thus, facilitating the surface coating of the ceramic material with chitosan. Specifically, one carboxylate group on the oxalic acid forms a relatively strong surface chelate via ester linkage with the support while the other carboxylate group forms ionic (or electrostatic) bonds with the $-NH_3^+$ groups present in chitosan. This binding facilitates the surface coating and

enhances the stability of the adsorbent in the pH range of 2-13. This surface binding of chitosan helps the spreading of the amine groups on the surface. Such surface binding also reduces the solubility/dissolution of chitosan (also increases stability of chitosan) at extreme pHs which are common to metal waste streams. Thus, the oxalic acid washing of the ceramic support material is important to activate the ceramic surface and to form a bridge between the ceramic support and chitosan. Without the oxalic acid surface activation, the chitosan binding is weak and any bound chitosan is easily dissolved. Thus, while acid-treatment is a process limitation, as the Office contends, the oxalic-acid treatment of the support forms a bridge between the ceramic support and chitosan. This allows effective binding of the chitosan. The stronger and more binding of chitosan, the greater the availability of the chitosan to chelate metal, thereby improving the ability of the biosorbent composition to remove heavy metals from waste water. Portier does not teach the use of oxalic acid or any particular acid to treat the surface in order to coat the chitosan onto the surface or the benefits of the pretreatment of the surface with oxalic acid. Applicant, therefore, asserts that Portier does not teach or suggest the claimed invention. Applicant respectfully requests reconsideration and withdrawal of the rejection under 35 U.S.C. § 102(b).

Claims 14, 23, 30, 31, and 36-38, 52-55, 57 and 58 stand rejected as allegedly anticipated by Portier, or alternatively, as allegedly obvious over Portier.

Applicant reasserts its arguments against the novelty rejection in view of Portier. Portier does not teach or suggest any particular acid to treat the surface. Without such information, a person of ordinary skill would engage in undue experimentation to determine the appropriate acid to treat the surface in order to effectively coat the chitosan onto the surface. Nothing in Portier directs the skilled artisan to choose oxalic acid to treat the surface. Accordingly, Portier

does not render obvious the claimed invention. Applicant respectfully requests reconsideration and withdrawal of this rejection.

35 U.S.C. § 103

Claims 12, 24, 29 and 56 stand rejected as allegedly obvious over Portier in view of Ostreicher (U.S. Patent No. 4,321,288).

Portier, either alone or in combination with Ostreicher, does not render obvious the claimed invention. To establish a *prima facie* case of obviousness, there must be 1) a suggestion to combine or modify, 2) a reasonable expectation of success, and 3) the references must suggest all of the claim limitations. MPEP § 2143. Portier does not teach an oxalic acid-treated ceramic or perlite support. Ostreicher does not cure this deficiency in Portier. Ostreicher does not teach an oxalic acid-treated perlite or an oxalic acid-treated ultra fine silica. Rather, Ostreicher treated the perlite or ultra fine silica with a melamine-formaldehyde cationic colloid to *reduce* the negative charge on the surface of the perlite or ultra fine silica, thereby improving the electrokinetic capture of fine particles. On the other hand, in the present invention, the oxalate complexes bring negative charge to the surface. The surface negative charge complex binds with the positively (protonated) amine of the chitosan, thus, facilitating the surface coating of the ceramic material with chitosan. Ostreicher, therefore, teaches away from the claimed invention. Applicant respectfully requests reconsideration and withdrawal of the rejections under 35 U.S.C. § 103.

CONCLUSION

All of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicant, therefore, respectfully requests that the Office reconsider all presently outstanding rejections and that they be withdrawn. It is believed that a full and complete

response has been made to the outstanding Office Action, and as such, the present application is in condition for allowance. If the Office believes, for any reason, that personal communication will expedite prosecution of this application, he is invited to telephone the undersigned at the number provided.

Prompt and favorable consideration of this Amendment is respectfully requested.

Respectfully submitted,

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